

D.T.E. 03-121
Attachment DTE-5-7

DIRECT TESTIMONY OF RICHARD LA CAPRA

2

4

6 (

8

10

12

14

16

18

20

22

Q29. Turning to the third area of your testimony Mr. La Capra, please explain
the steps the Company has taken in its load research program since DPU
85-271A.

26

DIRECT TESTIMONY OF RICHARD LA CAPRA

A. As a result of the order in DPU 1720, Boston Edison Company accelerated its load research program to monitor continuously all rate classes. Currently, the Company has fifteen load research surveys in place which represent approximately 3,000 load research meters on its retail rate classes.

Exhibit BE-RLC-4, entitled "Summary of Surveys in 1991", contains a tabulation of the rate classes being surveyed during the 12 Months Ended December 31, 1991, including the sample design criteria of each survey. The exhibit also shows the contribution of each surveyed rate code, in percent, to annual kWh output and annual peak demand in the test year. Of note is the fact that the Company has load research meters on rate classes that represent in excess of 98% of annual kilowatthours and 99% of annual peak demand.

Q30. How does the Company perform sample design?

A. For surveys other than 100% sampled, the Company uses stratified random sampling techniques for the survey design which divides a population into homogeneous, non-overlapping subgroups or strata. Together, the strata form the entire population.

In some instances, the sample also includes one stratum of 100% sampled customers. This practice reduces the required overall sample size while maintaining the desired sample accuracy. The size of the stratified sample is determined by the Neyman allocation which minimizes the variance of the sample mean for a fixed sample size. The

DIRECT TESTIMONY OF RICHARD LA CAPRA

2 construction of the strata boundaries is accomplished using the Dalenius
Hodges rule which selects stratum divisions so that equal cumulative
scales result.

4 The total sample size is determined by selecting a random sample
within each stratum that meets the target accuracy level. The specified
6 sample size for each strata is increased by twenty percent to allow for
data collection problems.

8

Q31. Would you please describe the metering and translating processes of the
10 load research program?

12 A. The Company collects fifteen minute interval data from over 3,000 load
research meters. Traditionally, the Company utilized magnetic tape
14 recorders to collect this type of data but the trend is now towards
state-of-the-art electronic meters/recorders. There are approximately
16 600 magnetic tape recorders and 2,400 electronic recorders on the Boston
Edison system as of December 1991.

18 To process the data from these recorders, the Company purchased a
comprehensive computer package of load research software called
20 LODESTAR. The LODESTAR system consists of both a load data management
subsystem and load analysis subsystem.

22 The load data management programs read in the interval data from
load research meters and store it in a historical data base by customer
24 location. The Company's load research data base goes back to 1978 when
the first magnetic tape recorders were installed. Within the data
26 management subsystem, the LODESTAR programs allow the data to be edited,
plotted, reported and eventually archived.

DIRECT TESTIMONY OF RICHARD LA CAPRA

The LODESTAR programs in the load analysis subsystem extract the records from historical data base for analysis usually by rate schedule, rate code or service class. Within the load analysis subsystem, the data can also be reported, plotted, aggregated and transformed for ad hoc analysis. All reported statistics are stored in a historical analysis data base.

Q32. What is the target accuracy of load research surveys?

A. The target accuracy of the Company's load research surveys is typically at the 95% confidence level with $\pm 5\%$ accuracy for large rate classes while 95% confidence with $\pm 10\%$ for smaller classes is the rule.

The following is a summary of the Company survey designs in comparison to territory load for the test year based upon Exhibit BE-RLC-4 entitled "Summary of Surveys in 1991":

<u>Design Accuracy</u>	<u>Percent of Annual Output</u>	<u>Percent of Peak</u>
100% Sampled	48.68%	45.50%
95% @ $\pm 5\%$	49.93	54.20
95% @ $\pm 10\%$	<u>0.21</u>	<u>0.24</u>
Totals	<u>98.82%</u>	<u>99.94%</u>

The remaining rates for which load research meters are not in place include only streetlighting.

The kilowatthour usage of streetlighting represents 1.2% of the Company's annual sales and contributes only a small amount to the

territory peak. To estimate streetlighting usage, we have developed an annual load shape equivalent to 4,200 burning hours based on sunrise and sunset tables.

Q33. Please explain the development of the test year load data.

A. To develop load data for the probability of dispatch program, the Company used actual 1991 load research data from the sample surveys described in Exhibit BE-RLC-5.

For purposes of flexibility in the cost-of-service study, it was required that forty-eight load shapes be developed for each hour of the test year. These load shapes by rate code were then aggregated into sixteen probability of dispatch (POD) groupings. Then on a monthly basis, three day types were produced for the POD program which included average weekday, average weekend and territory peak day. This translates into 576 POD load shapes for the test year. Exhibit BE-RLC-5 provides a list of the aggregated POD load shapes and the load research survey data applied to each rate code. The final load shapes were prorated to match billing kilowatthours and then brought up to the generation level using hourly loss factors.

As a test of the reasonableness of this approach, comparisons between recorded territory load and a summation of the ~~fourteen~~ aggregated POD load shapes were made. For the territory peak day, all months of aggregated load shapes are within $\pm 5\%$ of actual peak. Similarly, the percentages of annual on-peak and off-peak usage were within less than 1% of actual territory output.

LOAD RESEARCH PROGRAM
SUMMARY OF SURVEYS IN 1991

BOSTON EDISON COMPANY
Load Research Program
Summary of Surveys in 1991

Survey Number	Rate Designation	Rate Codes	Recorder Type	Design Criteria	Sample Size	Annual Output	Annual Peak
27	G-1	011, 018, 078, 191, 193	TMR	95% ± 5%	145	3.39%	4.92%
28	G-2	019, 112, 113, 130, 214, 234, 314, 430	TMR	95% ± 5%	150	18.69%	19.92%
29	G-2	079, 274, 374	TMR	95% ± 5%	78	1.32%	2.06%
2	G-3	417,477	MT	100% Sampled	452	21.29%	18.00%
N/A	G-3	507	MT	100% Sampled	1	0.96%	0.66%
4	G-3	407	MT	100% Sampled	4	0.14%	0.10%
30	R-1	020	TMR	95% ± 5%	228	19.84%	22.37%
21	R-1	021	TMR	95% ± 5%	151	2.38%	2.47%
23	R-1	022, 023	TMR	95% ± 5%	234	4.31%	2.46%
22	R-2	030, 031, 032, 033	TMR	95% ± 10%	58	0.20%	0.23%
26	R-4	224, 225, 226	TMR	95% ± 10%	29	0.01%	0.01%
6A-M	T-2	607, 617, 627, 677, 707, 717, 777, 907, 917, 977	MT/TMR MT/TMR MT/TMR	100% Sampled 100% Sampled 100% Sampled	1446	22.50%	23.11%
N/A	MT	506	MT	100% Sampled	1	1.19%	1.05%
N/A	WR	510	MT	100% Sampled	1	0.14%	0.00%
N/A	S-9	Concord & Wellesley	MT	100% Sampled	8	2.46%	2.58%
N/A	NE	512	MT	100% Sampled	1	N/A	N/A
	TOTAL				2987	98.82%	99.94%

Key: MT Magnetic Tape recording device
TMR Electronic recording device (either Model 82 or Model 92)